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Annual Report for

**Brookhaven
National
Laboratory**

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Introduction

Epidemiologic surveillance at U.S. Department of Energy (DOE) facilities consists of regular and systematic collection, analysis, and interpretation of data on absences due to illness and injury in the work force. Its purpose is to provide an early warning system about health problems occurring among employees at participating sites. Data are collected by coordinators at each site and submitted to the Epidemiologic Surveillance Data Center, located at the University of Washington, where quality control procedures and analyses are carried out. Rates of absences and rates of diagnoses associated with absences are analyzed by occupation and other relevant variables. They may be compared with the disease experience of different groups within the DOE work force and with populations who do not work for DOE to identify disease patterns or clusters that may be associated with work activities. In the future, the results of epidemiologic surveillance will be combined with those of medical surveillance and exposure surveillance to form an integrated approach to worker health protection.

In this annual report, the 1993 morbidity data for Brookhaven National Laboratory (BNL) are

summarized. These analyses focus on absences of 5 or more consecutive days occurring among workers aged 16-69 years. They are arranged into five sets of tables that present: 1) the distribution of the labor force by occupational category and pay status; 2) the absences per person, diagnoses per absence, and diagnosis rates for the work force as a whole; 3) diagnosis rates by type of disease or injury; 4) diagnosis rates by occupational category; and 5) relative risks for specific types of disease or injury by occupational category. Deaths occurring among active workers are listed separately; they are not included in any tables. All rates presented in this report are age-adjusted (see glossary) and represent the number of diagnoses reported per 1,000 persons in 1 year.

The data included in this report are supplemental to, but do not replace, those reported in other safety, industrial hygiene, and health physics reports prepared by DOE. They are based on absences reported by the sites as of May 1994. There has been no attempt to validate diagnoses with medical records, pathology, or other laboratory reports. Also, there has been no attempt to validate occupational information reported by the site. For reporting purposes, occupational titles have been grouped into broad categories within which a great deal of diversity in tasks and exposures is likely to exist.

Overview

Located at the center of Long Island, New York, Brookhaven National Laboratory is one of the nation's leading scientific research laboratories. BNL was established in 1946 on the former site of Camp Upton and is operated by Associated Universities, Inc. (AUI), under contract with DOE. AUI is an independent corporation, governed by a board of trustees, whose members are affiliated with both national and international universities, research institutions, and industrial organizations.

BNL's initial mission, to carry out research on the peaceful aspects of nuclear science, has been considerably broadened to include basic and applied research in many different areas. BNL's primary objective has always been to gain a deeper understanding of the laws of nature—the necessary foundation for all technical advances. New knowledge is constantly sought in such fields as physics, chemistry, biology, mathematics, medicine, oceanography, atmospheric sciences, and energy technology.

Labor Force by Occupational Category, 1993

During 1993, there were 3,480 employees (aged 16-69) identified by Brookhaven as participants in epidemiologic surveillance. This represented an increase of 43 (1.3%) from the beginning of 1992. Sixty-five percent of white collar workers were salaried, whereas 18% of blue collar workers were salaried. The occupational categories with the largest number of employees were professional (41%), technical (23%), and administration (20%). The composition of the work force by occupational category and salary status is given in Table 1.

	Occupational Category	Number 1993	Number 1992	% Change from Last Year
White Collar	Administration	683	675	1.2
	• Salaried	272	269	1.1
	• Hourly	370	402	-8.0
	• Unknown	41	4	925.0
	Professional	1,424	1,385	2.8
	• Salaried	1,310	1,307	0.2
	• Hourly	64	73	-12.3
	• Unknown	50	5	900.0
	Technical	806	775	4.0
	• Salaried	312	281	11.0
	• Hourly	470	489	-3.9
	• Unknown	24	5	380.0
	Subtotal	2,913	2,835	2.8
Blue Collar	Service	218	231	-5.6
	• Salaried	31	32	-3.1
	• Hourly	183	197	-7.1
	• Unknown	4	2	100.0
	Craftsmen & Manual Laborers	285	296	-3.7
	• Salaried	39	31	25.8
	• Hourly	239	265	-9.8
	• Unknown	7	0	N/C
	Nuclear	62	65	-4.6
	• Salaried	31	26	19.2
	• Hourly	28	39	-28.2
	• Unknown	3	0	N/C
	Other	2	10	-80.0
	• Salaried	0	0	0.0
	• Hourly	1	1	0.0
• Unknown	1	9	-88.9	
	Subtotal	567	602	-5.8
	TOTAL	3,480	3,437	1.3

*Table 1.
Labor Force by Occupational Category*

Absences Among Work Force, 1993

Absences per Person. In 1993, 229 Brookhaven employees reported an absence of 5 or more consecutive work days because of illness or injury. Twenty-seven (12%) of these workers had two or more absences. There was a total of 258 absences among all employees (Table 2.A).

Diagnoses per Absence. A total of 346 diagnoses associated with 258 absences of 5 or more days were reported to the Epidemiologic Surveillance Data Center. Multiple diagnoses were reported for 70 (27%) of the absences (Table 2.B).

Diagnoses Rates. In 1993, 346 diagnoses noted for absences of 5 or

more consecutive work days yielded an age-adjusted rate of 95.1 per 1,000 persons. The diagnosis rate for women (106.3 per 1,000) was slightly higher than the rate for men (88.7 per 1,000) (Table 2.C).

Employee Category	Number of Workers	Number of Absences (%)				Total Persons Absent at Least Once	Total Number of Absences
		0	1	2	3		
Male	2,677	2,500 (93.4)	158 (5.9)	18 (0.7)	1 (0.0)	177	197
Female	803	751 (93.5)	44 (5.5)	7 (0.9)	1 (0.1)	52	61
TOTAL	3,480	3,251 (93.4)	202 (5.8)	25 (0.7)	2 (0.1)	229	258

Table 2.A.
Absences per Person

Employee Category	Number of Diagnoses per Absence						Total Number of Absences	Total Number of Diagnoses
	1	2	3	4	5	6		
Male	146	43	5	2	0	1	197	261
Female	42	15	3	1	0	0	61	85
TOTAL	188	58	8	3	0	1	258	346

Table 2.B.
Diagnoses per Absence

Employee Category	Number of Workers	Number of Diagnoses†	Crude Rate per 1,000	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Male	2,677	261	97.5	88.7	76.9	102.4
Female	803	85	105.9	106.3	84.2	134.1
TOTAL	3,480	346	99.4	95.1	84.2	107.5

Table 2.C.
Diagnosis Rates

†Includes all diagnoses reported with an absence of 5 or more days, including absences for pregnancy and delivery.
*Standardized to age distribution of 1970 U.S. population.

Diseases and Injuries by Diagnostic Category, 1993

The age-adjusted diagnosis rate for each diagnostic category is given for all workers and separately for each gender (Tables 3-5). Table 6 describes diagnoses associated with pregnancy, labor, and delivery. As Table 3 shows, the three diagnostic categories with the highest rates were external cause of injury (22.6 per 1,000), respiratory system (15.9 per 1,000), and musculoskeletal system (9.6 per 1,000). Together, these three categories accounted for 54% of all diagnoses. Because the patterns of diagnoses reported by men and women differ, Tables 4 and 5, which show the diagnosis rates separately by gender, provide a better description of disease and injury patterns in the work force.

The leading diagnostic category among men, accounting for 27% of all diagnoses, was external causes of injury, with 67 men reporting 71 diagnoses. Eighteen of these diagnoses were related to overexertion and strenuous movements, 17

to unspecified causes, and 16 were due to falls. The second most common diagnosis group associated with an absence among men was musculoskeletal disorders, with 29 men reporting 37 diagnoses. More than 54% of these diagnoses were dorsopathies (spinal disorders). Respiratory diseases ranked third, with 36 men reporting 38 diagnoses. Among these diagnoses, 45% were related to chronic conditions and 32% were due to upper respiratory problems. Twenty-two men reported 32 circulatory system diagnoses. Ischemic disease accounted for 31% of this category, and hypertension accounted for 28%. Eighteen men reported 21 digestive disorders of which seven diagnoses were related to hernias. Among the five men who reported malignancies in 1993, there was one lymphoma and one report each of colon, rectal, prostate, and kidney cancer.

The leading diagnostic category among women was respiratory system, with 17 women reporting 21 diagnoses. Forty-eight percent of these diagnoses were related to pneumonia or bronchitis, and one-third were due to upper respiratory problems. The second most common diagnosis group associated with an

absence was external causes of injury, with 11 women reporting 13 diagnoses. Six diagnoses were due to falls, four to overexertion and strenuous movement, and three diagnoses were of unspecified cause. Disorders of the genitourinary system was the next most common diagnostic category, with six women reporting eight diagnoses. Other less common diagnostic categories included digestive system, with five women reporting six diagnoses; musculoskeletal system, with five women reporting six diagnoses; and infectious disease, with six women reporting six diagnoses. Four women reported six diagnoses related to pregnancy and childbirth. This category is discussed on page 8.

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Infections & parasitic diseases	001-139	14	3.1	1.9	5.3
Malignant neoplasms	140-208, 230-234	5	1.2	0.5	2.9
• Digestive organs	150-159	2	0.5	0.1	2.0
• Respiratory system	160-165	0	0.0	0.0	0.0
• Breast	174-175	0	0.0	0.0	0.0
• Genitourinary	179-185	1	0.2	0.0	1.7
• Nervous system	191-192	0	0.0	0.0	0.0
• Leukemia, lymphoma	200-208	1	0.2	0.0	1.7
Benign neoplasms & other	210-229, 235-239	5	1.2	0.5	2.8
Endocrine & metabolic diseases	240-279	14	3.3	2.0	5.7
Blood & blood-forming organs	280-289	1	0.2	0.0	1.7
Mental disorders	290-319	4	1.5	0.5	5.0
• Alcoholism	303	1	0.2	0.0	1.5
• Drug abuse	304-305	0	0.0	0.0	0.0
Nervous system & sense organs	320-389	17	5.1	2.9	8.9
Circulatory system	390-459	35	9.1	6.4	13.0
• Hypertension	401	11	2.7	1.5	4.8
• Acute myocardial infarction	410	4	1.0	0.4	2.6
• Ischemic disease, not M.I.	411-414, 429.2	11	2.7	1.5	4.9
• Cerebrovascular disease	430-438	1	0.2	0.0	1.8
Respiratory system	460-519	59	15.9	11.9	21.4
• Upper respiratory	460-465, 470-478	19	4.9	2.9	8.1
• Pneumonia/bronchitis	466, 480-487	19	5.0	3.0	8.3
• Chronic respiratory conditions	490-496	21	6.0	3.6	10.0
Digestive system	520-579	27	8.0	5.1	12.5
• Hernias	550-553	7	2.3	0.9	5.5
• Gall bladder disease	574-575	3	0.7	0.2	2.2
Genitourinary system	580-629	11	4.3	2.1	8.9
• Benign prostatic hypertrophy	600	0	0.0	0.0	0.0
• Endometriosis	617	0	0.0	0.0	0.0
• Ovarian cysts	620.0-620.2	1	0.2	0.0	1.5
• Female genital pain/bleeding	625-626	1	0.8	0.1	5.9
Pregnancy & childbirth	630-676	6	3.8	1.5	9.1
Skin & subcutaneous tissue	680-709	2	0.4	0.1	1.6
Musculoskeletal system	710-739	43	9.6	7.1	13.0
• Dorsopathies	720-724	24	5.3	3.6	7.9
Other and ill-defined conditions	740-799	19	5.7	3.3	9.6
External causes of injury	E800-999	84	22.6	17.7	29.0
• Transport accidents	E800-849	5	1.1	0.5	2.7
• Medical accidents	E870-879	0	0.0	0.0	0.0
• Accidental falls	E880-888	22	6.1	3.7	10.1
• Accidents-struck by objects	E916-918	5	1.1	0.4	2.6
• Accidents-machinery	E919	1	0.2	0.0	1.7
Total minus pregnancies		340	91.4	80.9	103.2
TOTAL		346	95.1	84.2	107.5

Table 3.
Diseases and Injuries by Diagnostic Category - Males and Females

†Includes all diagnoses reported with an absence of 5 or more days.

*Standardized to age distribution of 1970 U.S. population.

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Infections & parasitic diseases	001-139	8	2.4	1.2	4.8
Malignant neoplasms	140-208, 230-234	5	1.5	0.6	3.6
• Digestive organs	150-159	2	0.6	0.1	2.3
• Respiratory system	160-165	0	0.0	0.0	0.0
• Breast	174-175	0	0.0	0.0	0.0
• Genitourinary	179-185	1	0.3	0.0	2.1
• Nervous system	191-192	0	0.0	0.0	0.0
• Leukemia, lymphoma	200-208	1	0.3	0.0	2.2
Benign neoplasms & other	210-229, 235-239	4	1.2	0.4	3.1
Endocrine & metabolic diseases	240-279	10	2.9	1.6	5.5
Blood & blood-forming organs	280-289	1	0.3	0.0	2.2
Mental disorders	290-319	3	0.9	0.3	2.7
• Alcoholism	303	1	0.3	0.0	1.9
• Drug abuse	304-305	0	0.0	0.0	0.0
Nervous system & sense organs	320-389	12	5.5	2.7	11.5
Circulatory system	390-459	32	10.5	7.1	15.6
• Hypertension	401	9	2.7	1.4	5.1
• Acute myocardial infarction	410	4	1.2	0.4	3.2
• Ischemic disease, not M.I.	411-414, 429.2	10	3.0	1.6	5.5
• Cerebrovascular disease	430-438	1	0.3	0.0	2.0
Respiratory system	460-519	38	11.2	8.1	15.4
• Upper respiratory	460-465, 470-478	12	3.5	2.0	6.1
• Pneumonia/bronchitis	466, 480-487	9	2.7	1.4	5.2
• Chronic respiratory conditions	490-496	17	5.0	3.1	8.1
Digestive system	520-579	21	7.0	4.2	11.7
• Hernias	550-553	7	3.0	1.2	7.9
• Gall bladder disease	574-575	2	0.6	0.2	2.4
Genitourinary system	580-629	3	1.9	0.4	7.9
• Benign prostatic hypertrophy	600	0	0.0	0.0	0.0
• Endometriosis	617	N/A	N/A	N/A	N/A
• Ovarian cysts	620.0-620.2	N/A	N/A	N/A	N/A
• Female genital pain/bleeding	625-626	N/A	N/A	N/A	N/A
Pregnancy & childbirth	630-676	N/A	N/A	N/A	N/A
Skin & subcutaneous tissue	680-709	2	0.5	0.1	2.2
Musculoskeletal system	710-739	37	10.9	7.9	15.1
• Dorsopathies	720-724	20	5.9	3.8	9.2
Other and ill-defined conditions	740-799	14	6.1	3.1	12.0
External causes of injury	E800-999	71	25.8	19.4	34.4
• Transport accidents	E800-849	5	1.4	0.6	3.5
• Medical accidents	E870-879	0	0.0	0.0	0.0
• Accidental falls	E880-888	16	6.7	3.6	12.6
• Accidents-struck by objects	E916-918	5	1.4	0.6	3.5
• Accidents-machinery	E919	1	0.3	0.0	2.1
TOTAL		261	88.7	76.9	102.4

*Table 4.
Diseases and
Injuries
by Diagnostic
Category - Males*

†Includes all diagnoses reported with an absence of 5 or more days.
*Standardized to age distribution of 1970 U.S. population.

Table 5.
Diseases and
Injuries
by Diagnostic
Category -
Females

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Infections & parasitic diseases	001-139	6	5.2	2.3	11.5
Malignant neoplasms	140-208, 230-234	0	0.0	0.0	0.0
• Digestive organs	150-159	0	0.0	0.0	0.0
• Respiratory system	160-165	0	0.0	0.0	0.0
• Breast	174-175	0	0.0	0.0	0.0
• Genitourinary	179-185	0	0.0	0.0	0.0
• Nervous system	191-192	0	0.0	0.0	0.0
• Leukemia, lymphoma	200-208	0	0.0	0.0	0.0
Benign neoplasms & other	210-229, 235-239	1	0.9	0.1	6.5
Endocrine & metabolic diseases	240-279	4	5.1	1.8	14.4
Blood & blood-forming organs	280-289	0	0.0	0.0	0.0
Mental disorders	290-319	1	2.3	0.3	16.4
• Alcoholism	303	0	0.0	0.0	0.0
• Drug abuse	304-305	0	0.0	0.0	0.0
Nervous system & sense organs	320-389	5	4.4	1.8	10.5
Circulatory system	390-459	3	3.6	1.1	11.5
• Hypertension	401	2	2.2	0.5	9.3
• Acute myocardial infarction	410	0	0.0	0.0	0.0
• Ischemic disease, not M.I.	411-414, 429.2	1	1.4	0.2	9.9
• Cerebrovascular disease	430-438	0	0.0	0.0	0.0
Respiratory system	460-519	21	26.9	16.8	42.9
• Upper respiratory	460-465, 470-478	7	9.1	4.1	20.5
• Pneumonia/bronchitis	466, 480-487	10	10.9	5.6	21.2
• Chronic respiratory conditions	490-496	4	6.8	2.4	19.4
Digestive system	520-579	6	8.6	3.6	20.7
• Hernias	550-553	0	0.0	0.0	0.0
• Gall bladder disease	574-575	1	1.4	0.2	9.9
Genitourinary system	580-629	8	11.0	5.1	23.7
• Benign prostatic hypertrophy	600	N/A	N/A	N/A	N/A
• Endometriosis	617	0	0.0	0.0	0.0
• Ovarian cysts	620.0-620.2	1	0.8	0.1	6.0
• Female genital pain/bleeding	625-626	1	2.3	0.3	16.4
Pregnancy & childbirth	630-676	6	10.9	4.6	25.7
Skin & subcutaneous tissue	680-709	0	0.0	0.0	0.0
Musculoskeletal system	710-739	6	5.7	2.5	12.9
• Dorsopathies	720-724	4	3.4	1.3	9.0
Other and ill-defined conditions	740-799	5	7.7	3.0	19.5
External causes of injury	E800-999	13	13.9	7.8	24.9
• Transport accidents	E800-849	0	0.0	0.0	0.0
• Medical accidents	E870-879	0	0.0	0.0	0.0
• Accidental falls	E880-888	6	5.9	2.6	13.3
• Accidents-struck by objects	E916-918	0	0.0	0.0	0.0
• Accidents-machinery	E919	0	0.0	0.0	0.0
Total minus pregnancies		79	95.3	75.0	121.3
TOTAL		85	106.3	84.2	134.1

†Includes all diagnoses reported with an absence of 5 or more days.

*Standardized to age distribution of 1970 U.S. population.

Diagnoses Associated with Pregnancy, Labor, and Delivery

During 1993, four women reported six diagnoses related to pregnancy (Table 6). There were three diagnoses associated with pregnancy complications, two miscarriages, and one normal delivery.

Diagnoses by Occupational Category, 1993

During 1993, the age-adjusted diagnosis rate for all employees was approximately five times higher among blue collar workers than white collar workers (292.2 versus 58.0 per 1,000 persons) (Table 7). Craftsman and manual laborers, who comprised 8% of the work force, had the highest diagnosis rate (295.4 per 1,000), with 63 people reporting

103 diagnoses. The second highest diagnosis rate was among service workers (291.8 per 1,000), with 33 persons reporting 54 diagnoses. Administrators ranked third, with 42 workers reporting 69 diagnoses (96.2 per 1,000). The diagnosis rate for professional workers was substantially lower than all other employees.

The diagnosis rate among men was higher for blue collar workers (262.4 per 1,000) than for white collar workers (48.1 per 1,000) (Table 8). Craftsman and manual laborers had the highest rate (289.9 per 1,000), with 62 men reporting 101 diagnoses. Service workers ranked second (226.2 per 1,000), with 20 men reporting 33 diagnoses. Nuclear

and technical workers followed, with 62 men reporting 80 diagnoses (96.4 and 89.7 per 1,000, respectively).

The same pattern of higher diagnosis rates among blue collar workers was evident among women, although the number of women in these occupations was small (Table 9). The highest diagnosis rate was among service workers (649.0 per 1,000), with 13 women reporting 21 diagnoses. Employees in the crafts positions had the second highest rate (318.4 per 1,000), but this was based on only one woman reporting three diagnoses. The next highest rate was among administration workers (102.3 per 1,000), with 31 women reporting 52 diagnoses.

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Ectopic & Molar Pregnancy/Abortive Outcome	630-639	2	3.2	0.7	14.5
Complications Related to Pregnancy	640-648	3	5.5	1.6	18.3
Normal Delivery	650	1	2.3	0.3	16.4
Other Indications for Care in Pregnancy, Labor, & Delivery‡	651-659	0	0.0	0.0	0.0
Complications of Labor, Delivery, & Puerperium	660-676	0	0.0	0.0	0.0
TOTAL		6	10.9	4.6	25.7

Table 6. Diagnoses Associated with Pregnancy, Labor, and Delivery

†Includes all diagnoses reported with an absence of 5 or more days.

*Standardized to age distribution of 1970 U.S. population.

‡Includes multiple births.

	Occupational Category	Number of Workers	Number of Diagnoses†	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
White Collar	Administration	683	69	96.2	74.1	124.9
	Professional	1,424	34	22.1	14.6	33.4
	Technical	806	78	88.3	69.3	112.6
	Subtotal	2,913	181	58.0	49.0	68.5
Blue Collar	Service	218	54	291.8	217.7	391.2
	Craftsmen & Manual Laborers	285	103	295.4	225.0	388.0
	Nuclear	62	8	91.2	44.9	185.5
	Other	2	0	0.0	0.0	0.0
	Subtotal	567	165	292.2	244.5	349.2
TOTAL	3,480	346	95.1	84.2	107.5	

*Table 7.
Diagnoses by Occupational Category - Males and Females*

	Occupational Category	Number of Workers	Number of Diagnoses*	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
White Collar	Administration	208	17	64.4	39.7	104.6
	Professional	1,215	31	19.0	13.3	27.1
	Technical	740	72	89.7	69.4	115.9
	Subtotal	2,163	120	48.1	39.1	59.1
Blue Collar	Service	171	33	226.2	155.1	330.1
	Craftsmen & Manual Laborers	282	100	289.9	219.8	382.4
	Nuclear	59	8	96.4	47.4	196.2
	Other	2	0	0.0	0.0	0.0
	Subtotal	514	141	262.4	215.8	319.2
TOTAL	2,677	261	88.7	76.9	102.4	

*Table 8.
Diagnoses by Occupational Category - Males*

	Occupational Category	Number of Workers	Number of Diagnoses†	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
White Collar	Administration	475	52	102.3	76.1	137.5
	Professional	209	3	22.2	6.5	76.4
	Technical	66	6	81.5	31.3	212.0
	Subtotal	750	61	76.9	58.4	101.2
Blue Collar	Service	47	21	649.0	374.7	1,124.2
	Craftsmen & Manual Laborers	3	3	318.4	102.7	987.2
	Nuclear	3	0	0.0	0.0	0.0
	Other	0	0	0.0	0.0	0.0
	Subtotal	53	24	646.9	375.6	1,113.9
TOTAL	803	85	106.3	84.2	134.1	

*Table 9.
Diagnoses by Occupational Category - Females*

†Includes all diagnoses reported with an absence of 5 or more days, including absences for pregnancy and delivery.

*Includes all diagnoses reported with an absence of 5 or more days.

**Standardized to age distribution of 1970 U.S. population.

Relative Risk for Selected Disease Categories by Occupation, 1993

In Tables 10.A through 10.I, the risk of one or more absences associated with selected diagnostic categories for specific occupational groups is compared with that of the entire BNL work force. This comparison takes into account the possible confounding effects of age and gender. In contrast to the previous series of tables, these analyses examine the risk of a worker having *one or more* absences for 5 or more days in a diagnostic category during 1993. This was done to minimize the problem associated with one person having multiple absences for the same condition.

The statistical methods used to compare risks of absence are the relative risk and the 95% confidence interval. The relative risk is the rate of an absence in one group divided by the rate in a reference (comparison) group. A relative risk of *1.0* indicates that both groups have the same risk of absence. A relative risk of *2.0* indicates that a group has twice the risk of the reference group, whereas a relative risk of *0.5* implies that a group has one-half the risk of the reference group. The confidence interval is a statistical measure of the precision of the risk estimate. A 95% confidence interval indicates the range in which we would expect the

relative risk to fall 95% of the time. If the confidence interval includes the value *1.0*, then the observed difference in absence rates is likely to have occurred by chance; in other words, the relative risk is not statistically significant. For example, a relative risk with a confidence interval of *0.8 to 4.4* would not be considered statistically significant, whereas a relative risk with an interval of *1.7 to 4.2* would be considered statistically significant.

As would be expected, the higher diagnosis rates described in Tables 7-9 for craftsmen and service workers were also reflected in the analyses of relative risks. However, there was no particular diagnostic category that accounted for the higher overall rates. Craftsmen and manual laborers were significantly more likely to be absent at least once during 1993 for diseases of the nervous system (relative risk [RR] = 4.5), diseases of the circulatory system (RR = 4.8), diseases of the respiratory system (RR = 4.0), diseases of the musculoskeletal system (RR = 3.4), and external causes of injury (RR = 3.4). There was also a suggestion of elevated risk for infectious diseases (RR = 3.5). Similarly, service workers were found to have statistically significant elevated risk of absence associated with endocrine and metabolic disease (RR = 5.8); diseases of the respiratory system (RR = 2.9); diseases of the musculoskeletal system (RR = 2.8); and symptoms, signs, and ill-defined conditions (RR = 4.2).

The lower overall diagnosis rates observed among professional workers was also apparent in the relative risk analyses. Again, there was no particular diagnostic category that accounted for the lower overall rates. Significant reductions in risk among professional positions were observed for diseases of the circulatory system (RR = 0.3), diseases of the respiratory system (RR = 0.2), diseases of the digestive system (RR = 0.1), diseases of the musculoskeletal system (RR = 0.2), and external causes of injury (RR = 0.2).

The reasons for the large differences in overall diagnosis rates and in relative risks for particular diagnostic categories among the different occupational categories is unknown. However, the consistency of the differences across broad diagnostic categories suggests that incomplete reporting among certain employee groups may be an important factor.

Deaths Among Active Workers, 1993

During 1993, two deaths among active workers were reported to the Epidemiologic Surveillance Data Center. One was attributed to breast cancer and the other to cardiomyopathy leading to congestive heart failure.

Occupational Category	Person-Years	Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	683	4	1.0	0.3	3.4
Professional	1,424	1	0.2	0.0	1.5
Technical	806	4	1.6	0.5	5.2
Service	218	0	0.0	0.0	0.0
Craftsmen & Manual Laborers	285	3	3.5	1.0	12.3
Nuclear	62	1	7.1	0.9	58.7
TOTAL (Reference Group)†	3,478	13	1.0		

Table 10.A.
Infections and Parasitic Diseases

Occupational Category	Person-Years	Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	683	2	0.8	0.2	3.7
Professional	1,424	2	0.4	0.1	1.7
Technical	806	2	0.9	0.2	3.6
Service	218	3	5.8	1.6	20.3
Craftsmen & Manual Laborers	285	3	3.0	0.8	11.3
Nuclear	62	0	0.0	0.0	0.0
TOTAL (Reference Group)†	3,478	12	1.0		

Table 10.B.
Endocrine and Metabolic Diseases

Occupational Category	Person-Years	Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	683	3	0.8	0.2	3.0
Professional	1,424	2	0.3	0.1	1.4
Technical	806	4	1.2	0.4	3.5
Service	218	2	2.1	0.5	9.4
Craftsmen & Manual Laborers	285	5	4.5	1.6	12.5
Nuclear	62	0	0.0	0.0	0.0
TOTAL (Reference Group)†	3,478	16	1.0		

Table 10.C.
Diseases of the Nervous System and Sense Organs

Occupational Category	Person-Years	Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	683	3	0.7	0.2	2.8
Professional	1,424	3	0.3	0.1	0.9
Technical	806	4	0.7	0.2	2.0
Service	218	3	2.4	0.7	8.4
Craftsmen & Manual Laborers	285	12	4.8	2.4	9.7
Nuclear	62	0	0.0	0.0	0.0
TOTAL (Reference Group)†	3,478	25	1.0		

Table 10.D.
Diseases of the Circulatory System

Occupational Category	Person-Years	Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	683	13	1.0	0.5	1.9
Professional	1,424	4	0.2	0.1	0.5
Technical	806	9	0.8	0.4	1.7
Service	218	9	2.9	1.4	5.9
Craftsmen & Manual Laborers	285	17	4.0	2.3	7.1
Nuclear	62	1	1.3	0.2	9.2
TOTAL (Reference Group)†	3,478	53	1.0		

Table 10.E.
Diseases of the Respiratory System

*Persons with multiple absences during the time period were counted only once.

**Adjusted for age and gender - compared with all occupational categories.

†Two individuals with occupational category "Other" had no diagnoses. They are part of the reference group not detailed in these tables.

Occupational Category	Person-Years	Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	683	6	1.5	0.6	3.8
Professional	1,424	1	0.1	0.0	0.8
Technical	806	7	1.3	0.6	3.1
Service	218	3	2.0	0.6	6.6
Craftsmen & Manual Laborers	285	5	2.6	0.9	7.0
Nuclear	62	1	2.4	0.3	18.3
TOTAL (Reference Group)†	3,478	23	1.0		

Table 10.F.
Diseases of the Digestive System

Occupational Category	Person-Years	Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	683	3	0.5	0.1	2.0
Professional	1,424	3	0.2	0.1	0.7
Technical	806	10	1.2	0.6	2.4
Service	218	6	2.8	1.2	6.7
Craftsmen & Manual Laborers	285	11	3.4	1.7	6.9
Nuclear	62	1	1.5	0.2	10.9
TOTAL (Reference Group)†	3,478	34	1.0		

Table 10.G.
Diseases of the Musculoskeletal System

Occupational Category	Person-Years	Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	683	5	1.5	0.5	4.3
Professional	1,424	1	0.1	0.0	1.1
Technical	806	2	0.5	0.1	2.2
Service	218	4	4.2	1.4	12.6
Craftsmen & Manual Laborers	285	4	2.8	0.9	9.3
Nuclear	62	1	3.0	0.4	23.3
TOTAL (Reference Group)†	3,478	17	1.0		

Table 10.H.
Symptoms, Signs, and Ill-Defined Conditions

Occupational Category	Person-Years	Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	683	12	1.0	0.5	2.0
Professional	1,424	5	0.2	0.1	0.4
Technical	806	27	1.4	0.9	2.1
Service	218	8	1.5	0.7	3.2
Craftsmen & Manual Laborers	285	24	3.4	2.1	5.4
Nuclear	62	2	1.2	0.3	4.9
TOTAL (Reference Group)†	3,478	78	1.0		

Table 10.I.
External Causes of Injury

*Persons with multiple absences during the time period were counted only once.

**Adjusted for age and gender - compared with all occupational categories.

†Two individuals with occupational category "Other" had no diagnoses. They are part of the reference group not detailed in these tables.

DIAGNOSTIC CATEGORIES

Category of Diagnoses	ICD-9-CM Code	Types of Illness in Category
All conditions	001-V82	All reported health events.
Infectious and parasitic diseases	001-139	Diseases caused by bacteria, viruses, and parasites.
Malignant neoplasms	140-208, 230-234	All cancers, regardless of the part of the body affected.
Benign neoplasms and neoplasms of uncertain behavior and unspecified nature	210-229, 235-239	Tumors that are not cancerous or that do not exhibit clearly malignant behavior, regardless of the part of the body affected.
Endocrine, nutritional and metabolic diseases, and disorders of the immune system	240-279	Diseases and conditions affecting the hormone secreting glands and organs; nutritional disorders, such as vitamin deficiency; metabolic diseases, such as diabetes and gout; and problems affecting the antibody producing system.
Diseases of the blood and blood-forming organs	280-289	Includes anemia and hemophilia, but excludes leukemia.
Mental disorders	290-319	Psychiatric diagnoses, such as dementia, schizophrenia, depression, and anxiety disorders; alcoholism; drug dependence; and eating disorders, such as bulimia.
Diseases of the nervous system and sense organs	320-389	Diseases affecting the brain, spinal cord, and peripheral nerves. Examples include meningitis; encephalitis; hereditary diseases, such as Huntington's chorea; Alzheimer's and Parkinson's disease; epilepsy; multiple sclerosis; migraine; diseases of the eye, such as cataract and glaucoma; and diseases of the ear, such as conductive hearing loss and otitis.
Diseases of the circulatory system	390-459	Diseases involving the heart, arteries, veins, and lymphatic system. Examples include rheumatic fever, heart murmurs, heart attacks, angina, hardening of the arteries, varicose veins, hemorrhoids, and phlebitis.
Diseases of the respiratory system	460-519	Includes colds, sinusitis, laryngitis, pneumonia and influenza, chronic bronchitis, asthma, and emphysema.
Diseases of the digestive system	520-579	Diseases affecting the teeth and mouth, salivary glands, digestive tract, and the abdominal cavity. Examples include dental abscess, ulcers, appendicitis, hepatitis (excluding viral hepatitis), cirrhosis of the liver, gallstones, pancreatitis, abdominal hernia, and intestinal polyps.
Diseases of the genitourinary system	580-629	Diseases affecting the kidneys, the prostate and testes; benign breast diseases; infertility (male and female); pelvic inflammatory disease; diseases of the ovary; and menstrual disorders.
Complications of pregnancy, childbirth, and puerperium	630-676	Includes miscarriage; complications of pregnancy, such as hemorrhage; pregnancy-related high blood pressure; pre-eclampsia; premature labor or other complications of labor.
Diseases of the skin and subcutaneous tissue	680-709	Includes acne, cellulitis, sunburn, psoriasis, and seborrhea.
Diseases of the musculoskeletal system and connective tissue	710-739	Includes arthritis, systemic lupus erythematosus, ankylosing spondylitis, herniated intervertebral disc ("slipped disc"), lumbago, sciatica, rheumatism, tendinitis, and osteoporosis.
Congenital anomalies	740-759	Abnormal anatomical development present at birth. Includes spina bifida, cleft palate, harelip, and various chromosomal anomalies, such as Klinefelter's syndrome.
Certain conditions originating in the perinatal period	760-779	Conditions or diseases of the mother that can produce perinatal illness or death of the fetus or newborn. Examples include maternal high blood pressure, maternal malnutrition, ectopic pregnancy, and breech birth. Also includes other conditions originating in the perinatal period, such as fetal malnutrition or slow growth, injuries related to birth trauma, and perinatal jaundice.
Symptoms, signs, and ill-defined conditions	780-799	Symptoms, signs, abnormal results of laboratory or other tests, and conditions for which no specific diagnosis has been made. Examples include blackout, chills, dizziness, fatigue, pallor, abnormal weight loss, undiagnosed chest pain, and heartburn.
Injury and poisoning	800-999	Dislocation of joints; sprains and strains of joints and associated muscles; concussions; bruises; cuts; internal injuries due to crushing, puncture, tearing, or blunt impact; burns; blisters; poisoning; frostbite; heat stroke; and complications of medical or surgical care.
Fractures, all sites	800-829	Cracks or breaks of any bone.
Dislocations	830-839	Separation of a bone from its normal socket or joint.
Sprains and strains of joints and adjacent muscles	840-848	Sprains include injuries to muscle from overexertion or from stretching the muscle beyond its normal limit. Sprains include injuries involving tearing or overextending the ligaments of a joint.
Intracranial injuries excluding those with skull fractures	850-854	Includes concussions, internal bruises, and hemorrhages within the skull without a fracture of the bones of the skull.
Internal injuries of the chest, abdomen, and pelvis	860-869	Includes internal injuries to the chest, abdomen, and pelvis and the organs within these areas of the body that do not involve an open wound.
Open wounds	870-897	Includes animal bites, cuts, lacerations, punctures, and amputations, excluding the arteries and veins.
Other injuries and effects of external causes	900-999	Miscellaneous injuries, including injuries to the arteries and veins, problems that occur an extended period of time after the injury has taken place ("late effects"), superficial bruises and abrasions, burns, post-injury shock, poisoning, toxic side effects of chemicals, heat stroke, electrocution, and altitude sickness.
Motor vehicle traffic accidents	E810-E819	Includes accidents involving motor vehicles alone or with other motor vehicles, pedestrians, or vehicles operated by pedals.
Other accidents	E916-E928	Includes accidents involving falling objects or machinery; accidents related to explosions; and those related to electrical current, radiation, hot or corrosive substances, noise, and overexertion.
Supplementary classifications related to personal or family history of disease	V10-V19	Covers situations in which the person is not ill or injured but has a personal or family history of problems, such as cancer, mental illness, allergies, or arthritis, that may affect his or her risk of illness.
Supplementary classifications related to health care for reproduction and child development	V20-V28	Includes problems related to pregnancy, postpartum care, contraception, outcome of delivery, and physical development of child.
Contact with health services for reasons other than illness or injury	V50-V59	Includes care for workers who have been treated previously for an illness or injury that is no longer present but who receive care to complete treatment or prevent recurrence.

Adjustment - A mathematical procedure for rates in which the effects of differences (such as age) in groups have been removed. The purpose of adjustment is to allow comparisons between two or more groups.

Epidemiologic Surveillance - The regular and systematic collection of data and interpretation of the distribution of illness, injury, and death in the DOE labor force over time.

ICD-9-CM - The ICD-9-CM (International Classification of Diseases-9th Revision-Clinical Modification) is based on the ICD-9 originally published by the World Health Organization and widely accepted as a standard for the coding of cause of death. The ICD-9-CM is required for the reporting of morbidity to all U.S. Public Health Service programs.

Diagnoses Rate - The number of new, reported health events observed among DOE workers per thousand DOE workers at risk during a given period of time.

The age-adjusted rate was calculated using the 1970 U.S. population. The age-adjusted rate represents the hypothetical rate that would have been observed if the 1993 group had the same age distribution as the 1970 U.S. population. The age-adjusted rate is used to compare populations that differ in age. The 1970 U.S. population was selected because it is the standard most used for published morbidity data.

The illness and injury absence rate is defined as an absence due to illness or injury of 5 or more consecutive work days, divided by the total number of workers. OSHA-recordable events may or may not involve an absence from work.

The 95% confidence interval is based on the normal approximation to the binomial distribution where the calculated illness and injury absence rate falls within the interval. The true rate lies within this interval 95% of the time.